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DOES IT PAY?

BY O. M. LELAND,

President of the Society.

Is it worth while to attend the annual convention of one's professional society, or specifically, the Society for the Promotion of Engineering Education? For many members the personal expense involved is quite a serious item. Moreover, this financial burden is likely to bear most heavily upon the younger members who are less able to sustain it. So the question arises annually, "Does it pay?"

The importance of attending the convention does not have to be impressed upon the older members. They have the knowledge which comes from experience and appreciate the value of the occasion for obtaining social and intellectual contacts with minds having a common interest. Also, the idea of rendering service to the profession through participation in the work of the Society represents a real obligation. To the younger members, however, the benefits are too likely to be overlooked or to be underestimated when the expense is taken into consideration.

It is somewhat difficult to analyze the advantages which one derives from a certain meeting. Some highly technical specialist may say pessimistically that he took away "no new ideas," or that he might well have remained at home since the Proceedings would contain the full record. But it is probably safe to say that the great majority would agree conservatively that it was "a good meeting" and the time passed too quickly. Perhaps the papers and discussions were interesting and instructive. A speaker may have presented a subject for discussion which would lead to a new activity of the Society and might even revolutionize some phase of the educational process. However, the greatest agreement would undoubtedly be reached on the value of the associations between individuals

and among small groups—those intangible values which do not appear in the printed proceedings, and which, otherwise than at the annual meetings, could be obtained only at great expense and by much travel.

For the younger members of this Society, the convention possesses a peculiar significance. In no other profession, probably, does so much inspiration come to the young man from association with the older leaders as in teaching, and this is true especially in the field of engineering education. The acquaintances formed and developed at these meetings frequently lead to friendships and official relationships which are particularly advantageous to the younger man in his future advancement. For it should be realized that many, if not all, of the older members are employers of younger men or the consultants of such employers. If the young engineering teacher wishes to advance,—and who does not?—his acquaintanceship with such men from other institutions is of the utmost value. This can be most easily cultivated at the annual convention. From this standpoint, or from the general one of professional development, the expense involved may reasonably be regarded as an investment, for it is likely to bear generous dividends.

The young engineering teacher cannot afford to ignore the advantages of attending the annual meetings of the Society any more than he can afford to dispense with his Society membership. If one meeting is so far away as to make the expense of the trip prohibitive, it is practically certain that the next will be much nearer. It would seem that most meetings would be within the reach of almost any member of the Society. The wise teacher will come to regard the expenditure as a necessary item in his budget for personal development.

BY BOAT TO THE ORONO MEETING.

My Dear Dean Bishop:

I have just received the program of the Annual Meeting of the S. P. E. E. at the University of Maine, and am taking the liberty of calling your attention to an omission which seems to me might well be corrected in any supplementary bulletin which you may send out before the meeting.

Courtesy Bangor Daily News

THE LUCERNE IN MAINE CLUB HOUSE.

For all the delegates who intend to go to Orono by train, by far the best way of making the trip is by the Eastern Steamship Line from Boston to Bangor. The trip is delight-

ful, the scenery from Rockland to Bangor very beautiful, and, of course, in warm weather the comfort of travel by boat is greatly to be desired.

The journey from Bangor to Orono may be made by trolley or train in a short time, and, of course, this part of the trip would have to be made in the same way if the delegates reached Bangor by train. Having spent 25 summers in this section of Maine, and knowing well the attractiveness of the Boston to Bangor trip, I want as many of the delegates as possible to experience it.

DEAN J. W. VOTEY, OF THE UNIVERSITY OF VERMONT, HAS EXTENDED TO ALL MEMBERS WHO PLAN TO MOTOR TO THE MAINE MEETING AN INVITATION TO ASSEMBLE AT THE UNIVERSITY OF VERMONT AND ORGANIZE BEFORE REACHING ORONO, AND TO BE THE GUESTS OF THE UNIVERSITY AT DINNER FRIDAY, JUNE 24.

IF YOU ARE PLANNING TO ACCEPT THIS INVITATION, PLEASE NOTIFY DEAN VOTEY AT ONCE.

THE SUMMER SCHOOL FOR ENGINEERING TEACHERS.

BY H. P. HAMMOND,

Associate Director of Investigation.

As announced in the March number of the JOURNAL, a summer school for engineering teachers will be inaugurated by the Society, under the supervision of the Board of Investigation and Coordination, during the coming summer. A special appropriation of $7500 from the Carnegie Corporation provides funds for operating the school during its first year. Plans for the programs of the two sessions, selection of teaching staffs, and other details are now practically completed and are given in substance in the following notes which are published so that the members of the Society may be kept informed regarding this new and interesting enterprise.

The Cornell session of the school will open on July 6th and close on July 26th. The Wisconsin session will open on July 11th and close on July 30th.

Staff.—The members of the staff have been chosen and all have accepted invitations to serve. The following lists give the names of the regular members of the staff. In addition, there will be a number of speakers on general topics.

CORNELL SESSION.

Director: DEXTER S. KIMBALL, Dean of the College of Engineering, Cornell University.

Teachers of Mechanics:

J. E. BOYD, Professor of Mechanics, Ohio State University.

W. S. FRANKLIN, Professor of Physics, Massachusetts Institute of Technology.

E. W. RETTGER, Professor of Mechanics, Cornell University.

Teacher of Laboratory Courses:

G. B. UPTON, Professor of Experimental Engineering, Cornell University.

Teachers of Subjects Related to Mechanics, and Special Lecturers:

C. M. ALLEN, Professor of Hydraulic Engineering, Worcester Polytechnic Institute.

VLADIMIR KARAPETOFF, Professor of Electrical Engineering, Cornell University.

M. S. KETCHUM, Dean of the College of Engineering, University of Illinois.

STEPHAN TIMOSHENKO, Westinghouse Electric and Manufacturing Company.

Educational Adviser:

G. A. WORKS, Dean of the College of Agriculture, Cornell University.

Secretary of the Conference:

C. L. WALKER, Professor of Sanitary Engineering, Cornell University.

WISCONSIN SESSION.

Director: E. R. MAURER, Professor of Mechanics and Chairman of the Department, University of Wisconsin.

Teachers of Mechanics:

A. P. POORMAN, Professor of Mechanics, Purdue University.

S. M. WOODWARD, Professor of Mechanics and Hydraulics, State University of Iowa.

Teachers of Laboratory Courses:

H. F. MOORE, Research Professor of Engineering Materials, University of Illinois.

M. O. WITHEY, Professor of Mechanics, University of Wisconsin.

Teachers of Subjects Related to Mechanics, and Special Lecturers:

EDWARD BENNETT, Professor of Electrical Engineering, University of Wisconsin.

O. A. LEUTWILER, Professor of Mechanical Engineering Design, University of Illinois.

C. S. SLICHTER, Dean of the Graduate School, University of Wisconsin.

STEPHAN TIMOSHENKO, Westinghouse Electric and Manufacturing Company.

F. E. TURNEAURE, Dean of the College of Engineering, University of Wisconsin.

Educational Adviser:
CURTIS MERRIMAN, Associate Professor of Education, University of Wisconsin.

Secretary of the Conference:
L. F. VAN HAGAN, Professor of Railway Engineering, University of Wisconsin.

Housing.—At Cornell, those attending the conference will be housed in West Founders Hall, one of the units of the Cornell dormitory system. The building is adjacent to Willard Straight Hall, the new Cornell Union, where meals may be obtained either in a cafeteria or a dining room. The charge for rooms will be $3.50 or $4.00 per week, depending upon location. Meals may be obtained at very reasonable cost. At Wisconsin, those in attendance will be housed in one of the new units of the men's dormitory system located at a beautiful spot overlooking Lake Mendota. Meals will be provided in the University Commons. The cost for room and meals at the Wisconsin session will not exceed $45 for the three-week period.

Program.—Meetings of the staffs of the schools were held at Ithaca and at Madison on Friday and Saturday, April 29th and 30th. At these meetings, tentative schedules of the programs of the schools were prepared. The following portion of the program of the Cornell session is given as an indication of the manner in which the work will be conducted. This program is subject to change, but will probably be carried out substantially as indicated.

Tuesday, July 5	Registration and Assignment of Rooms
Wednesday, July 6	
10 A.M.	Opening Address: The Purposes and Aims of the Summer School for Engineering Teachers.....H. P. Hammond
11 A.M.	Organization of the Group—Appointment of Committees, etc.

2 P.M.	The Place of the Study of Mechanics in the Engineering Curriculum	D. S. Kimball
3 P.M.	Outline of the Plan and Program of the Summer School	J. E. Boyd
Thursday, July 7		
9 A.M.	The Teaching of the Fundamentals of Mechanics	W. S. Franklin
2 P.M.	Group Seminars for discussion of the topic of the morning session	Franklin Boyd Rettger Works
Friday, July 8		
9 A.M.	Lecture: Mechanics before Newton	E. W. Rettger
10:30 A.M.	The Teaching of the Fundamentals of Mechanics	W. S. Franklin
2 P.M.	Group Seminars	Franklin Boyd Rettger Works
Saturday, July 9		
9 A.M.	Lecture, Electromechanics	V. Karapetoff
10:30 A.M.	Discussion	
P.M.	Recreation	
Monday, July 11		
9 A.M.	Equilibrium of Concurrent Co-Planar Forces	J. E. Boyd
10:30 A.M.	Lecture: The History of Mechanics; Newton and his Successors	E. W. Rettger
2 P.M.	Project Assignment: Devising Problems on Statics	Franklin Boyd Rettger Works
Tuesday, July 12		
8 A.M.	Observation of Undergraduate Class in Mechanics	

9 A.M.	Equilibrium of Non-Concurrent Co-Planar Forces	J. E. Boyd
10:30 A.M.	Couples	E. W. Rettger
2 P.M.	Group Seminars	Rettger Boyd Franklin Works
Wednesday, July 13		
9 A.M. to noon	Methods of Conducting Class in Materials Testing	G. B. Upton
P.M.	Recreation	
Thursday, July 14		
9 A.M.	Statics of Non-Concurrent Non-Co-Planar Forces	J. E. Boyd
10:30 A.M.	Dynamics of Rigid Bodies	E. W. Rettger
2 P.M.	Project Assignment: Preparation of a Set of Directions for a Laboratory Exercise	Boyd Franklin Rettger Works
Friday, July 15		
9 A.M.	Dynamics of Rigid Bodies	E. W. Rettger
10:30 A.M.	Dynamics of Rotation	W. S. Franklin
2 P.M.	Project Assignment: Design of Simple Apparatus for Use in Illustrating Principles of Mechanics	Rettger Franklin Boyd
Saturday, July 16		
9 A.M. to noon	Theory of Elasticity	S. Timoshenko
P.M.	Recreation	

In addition to the regularly scheduled items of the program, about half of the evenings will be devoted to lectures on general topics by well-known speakers. The other evenings will

either be left free or will be devoted to recreation. At the Cornell session it is planned to hold a smoker on the evening of Wednesday, July 6th, so that the members of the group may become acquainted with each other and with members of the staff. One of the interesting recreational features of the program at the Wisconsin session will be an all-day trip by automobile to the Dells of Wisconsin and the Devil's Lake region with inspection of a hydro-electric station en route. Both Madison and Ithaca afford unusual opportunities for pleasant recreation and diversion, of which advantage will be taken in arranging the programs. At both institutions the regular University Summer School will be in session and members of the S. P. E. E. group will be able to attend a wide range of lectures, concerts, and the like in addition to the special features of the programs of the Society's school itself.

Fees and Other Costs.—As previously announced, the only fee will be a registration charge of $10. The locations of the schools should make it possible for a teacher to attend from any one of a majority of the institutions of the country at a total cost not to exceed $100, including registration fee, railroad fares, and living expenses.

Applications.—Applications to attend the school are coming in rapidly, though the entire quota has not as yet been filled for either session. At the time of writing, May 5th, approximately forty definite applications have been received from teachers of all ranks and from colleges situated in all parts of the country. A number of other institutions have signified intention of sending representatives but have not as yet chosen individuals, and a number of teachers have indicated that they will attend if they can make necessary arrangements. Further applications will be gladly received at the Director's Office, 33 West 39th Street, New York City. It is hoped that all applications will be in hand by June first.

The large volume of correspondence concerning the school which is being received indicates clearly that the undertaking is looked upon as a very valuable one. Members of the staffs of the school have taken hold of the work with enthusiasm and

no effort is being spared to make the work so successful during the first year that its continuation in other years may be definitely assured. One of the most gratifying features of the responses is the caliber of the teachers who have signified their intention of attending the school. A number are heads of departments and teachers of extended experience. A considerable proportion are Associate or Assistant Professors. The Instructors who will attend are spoken of by their sponsors as "among the most promising younger teachers in the institution."

Further information regarding the summer school enterprise will be furnished by the author upon request.

THE IOWA PLACEMENT EXAMINATIONS AT THE UNIVERSITY OF MINNESOTA.[1]

BY T. A. LANGLIE,

University of Minnesota.

The Colleges of Engineering, Architecture, and Chemistry of the University of Minnesota, as cooperating members of the S. P. E. E., administered the Iowa Placement Examinations[2] in Chemistry, English, and Mathematics to all entering freshmen in 1924 and again in 1925 and 1926.[3] In 1924 the tests were given about two weeks after the beginning of classes. In 1925 and 1926 they were given before class work began. The data obtained have been analyzed by the Department of Psychology of the University of Minnesota at the request of Dean O. M. Leland of the above named colleges, and this report is a summary of that study.

In making this analysis the following questions were emphasized:

1. Do the Placement tests adequately reveal individual differences among college freshmen?

2. Do the Placement tests throw light on the adequacy of the present classification of students in the departments of Mathematics and Chemistry?

3. Could the tests be used for sectioning classes on the basis of ability in English, Mathematics, and Chemistry? If so,

[1] This study was made under the direction of Prof. Donald G. Paterson, of the Department of Psychology, to whom the writer is indebted for many valuable suggestions and criticisms.

[2] The purpose of the Iowa Placement Examinations has been previously published in this JOURNAL, G. D. Stoddard, "Iowa Placement Examinations," J. ENG. EDUC., Sept., 1925.

[3] The study of the 1926 data was added to this report after the 1924 and 1925 studies were completed. The 1926 figures are on engineering freshmen only.

should the tests be given before registration or after brief review in each subject?

4. Do the tests yield valuable information for the use of the Dean's office, Student Work Committees, and Advisors?

A. Extent to Which the Tests Reveal Individual Differences.

One measure of the extent to which a test discriminates between different abilities is the variability of the test scores. For example, the range of scores on the English Aptitude test is from 19 to 59 with the mean at 42.42 and standard deviation of 7.56. This standard deviation indicates that approximately 68 per cent of the scores fall between 38.86 and 49.98. The Chemistry Training test has a range of scores from 1 to 160 with the mean at 66.20 and standard deviation of 34.50. Here, approximately 68 per cent of the scores fall between 31.70 and 100.70. A convenient and relative measure of variability is the coefficient of relative variability. (Standard deviation divided by the Mean.) This index allows direct comparison between two tests even though scoring units differ. For purposes of measuring individual differences, that test is most reliable, other things being equal, which has the largest coefficient of variability. The two tests discussed above, English Aptitude and Chemistry Training, have coefficients of variability of .18 and .52 respectively. Thus the Chemistry Training test emphasizes individual differences to a greater extent than does the English Aptitude test. The data for making similar comparisons of all the tests are given in Table I which presents the coefficients of variability for all of the tests for 1924, 1925 and 1926.

These tests reveal individual differences in ability and in knowledge of the various subjects to an unusually high degree, the Chemistry Training test being the most effective and the English Aptitude test the least effective. A comparison of these coefficients of variability for the two years shows that the 1925 tests are considerably improved in this respect.

TABLE I.

COEFFICIENTS OF VARIABILITY OF THE VARIOUS TESTS, 1924, 1925 AND 1926.

Freshmen in Colleges of Engineering, Architecture and Chemistry. Number of cases: 1924, 241; 1925, 242; 1926, 202.

Test.	Coef. of Variability.		
	1924.	1925.	1926.
English Aptitude (E.A.)	.14	.18	.21
English Training (E.T.)	.15	.32	.32
Mathematics Aptitude (M.A.)	.23	.36	.43
Mathematics Training (M.T.)	.18	.33	.34
Chemistry Aptitude (C.A.)	.09	.22	.22
Chemistry Training (C.T.)	.27	.52	.51

B. CLASSIFICATION OF STUDENTS IN MATHEMATICS AND CHEMISTRY.

Freshmen taking mathematics or chemistry are classified into two groups. In the department of mathematics all freshmen who have not had higher algebra register for Mathematics 9 which is higher algebra, no credit. All others register for Mathematics 11 [4] which is college algebra, five credits. At the end of two weeks those students in both courses who show sufficient ability proceed in Mathematics 11, the rest of the class taking Mathematics 9. This reclassification is made on the basis of tests and ratings by the faculty. In the Department of Chemistry, freshmen who have had no high-school chemistry register for Chemistry 14, five credits. Those who have had high-school chemistry register for Chemistry 4, four credits. These courses are both general inorganic chemistry and differ only in the degree of difficulty as indicated by their prerequisites.

Presumably the two groups taking mathematics have different abilities in mathematics and the two groups taking chem-

[4] In 1926 the Mathematics department classified freshmen into Mathematics 9. (Higher Algebra) and Mathematics 12 (Trigonometry). No transfer of students was made in 1925 as was done in 1924 and again in 1926.

istry have different abilities in chemistry. We may then ask the question: Do the test scores in mathematics and chemistry reveal these differences?

In order to compare the different "ability groups" directly, it has been necessary to put the test scores on a comparable basis. They cannot be compared directly because the tests are composed of different scoring units. (Raw scores, means, and standard deviations.) We have therefore utilized the customary statistical procedure of placing the mean score of each test at 50.00 and the standard deviation of each test at 10.00. A score of plus one standard deviation then becomes 60.00 and a score of minus one standard deviation becomes 40.00. These converted test scores are directly comparable. Thus a Chemistry Aptitude raw score of 84 becomes 60 and a Chemistry Training raw score of 101 becomes 60. In other words a score of 84 on the first named test is equivalent to a score of 101 on the latter. Table II presents these converted scores on the mathematics and chemistry tests for the different groups in the departments of mathematics and chemistry.

TABLE II.

MEAN SCORES OF DIFFERENT ACHIEVEMENT GROUPS IN TERMS OF TENTHS OF SIGMA.*

(Mean of total group equals 50.00; S.D. equals 10.00.)

Achievement Group	1925 Tests.				1924 Tests.			Differences.	
	Test.	Number of Cases.	Mean	S.D.	Number of Cases.	Mean	S.D.	'25.	'24.
Mathematics 9.....	M.A.	114	44.86	8.62	170	47.71	10.10	8.33	6.10
Mathematics 11....	M.A.	183	53.19	9.43	160	53.81	13.49		
Mathematics 9.....	M.T.	114	43.51	7.37	170	44.32	9.05	10.50	11.42
Mathematics 11....	M.T.	183	54.01	9.28	160	55.74	7.34		
Chemistry 14.....	C.A.	61	46.23	9.70	74	46.52	11.23	5.15	5.06
Chemistry 4.....	C.A.	168	51.38	9.12	170	51.58	8.96		
Chemistry 14.....	C.T.	61	39.94	6.42	74	40.40	8.48	13.70	13.81
Chemistry 4.....	C.T.	168	53.64	9.47	168	54.21	7.36		

* The same trend was obtained in 1926.

Other things remaining constant, the value of a test for revealing differences between two groups is directly proportional to the difference between the average scores of each group. A good test will show marked differences between different levels of ability. Again, other things being equal, the value of a test for these purposes is inversely proportional to the sizes of the standard deviation of each subgroup. A good test, then, will show large differences between the averages of two groups of differing ability, and each group will have a small standard deviation, *i.e.*, each subgroup will be homogeneous and separate from the other. Inspection of the above table reveals that the training tests are more effective for classification purposes than are the aptitude tests, according to these standards. There are wider differences between the mean scores of each level and the standard deviations of each level are smaller in terms of training test scores than in terms of aptitude test scores.

DIAGRAM I.

FINAL GRADES IN MATHEMATICS COURSES COMPARED WITH MATHEMATICS APTITUDE TEST SCORES.

Number of cases = Math. 9, — 114, Math. 11, — 183.
(Fall quarter, 1925.)

Mathematics 9
(Mean = 24.20 ± 9.05)

Mathematics Aptitude Test (Raw Scores)	F	E	D	C	B	A	Total
56							
51						1	1
46							
41	1			2			3
36			3	1	1	1	6
31	5		4	2	2	1	14
26	5		6	9	2	1	23
21	11	1	10	2	1	1	26
16	8	2	7	3	1		21
11	9		3			1	13
6	2			2			4
1	2			1			3
Total	43	3	33	22	7	6	114

Mathematics 11
(Mean = 32.95 ± 9.90)

Mathematics Aptitude Test (Raw Scores)	F	E	D	C	B	A	Total
56				3	1	2	6
51						2	2
46			2	4		1	7
41	3		7	2	4	2	18
36	5		8	7	6	7	33
31	5		11	14	6	5	41
26	9		10	11	2		32
21	9		7	4	1	1	22
16	8		6	1	1		16
11	2		2	1			5
6		1					1
1							
Total	41	1	53	47	21	20	183

Since these groups are differentiated on the basis of performance during the first two weeks as well as previous course work as explained above, it is of interest to determine how successfully the classification is actually accomplished. Diagrams I and II throw some light on this angle of the problem.

DIAGRAM II.

FINAL GRADES IN MATHEMATICS COURSES COMPARED WITH MATHEMATICS TRAINING TEST SCORES.

Number of cases same as in Diagram I. (1925.)

Mathematics Training Test (Raw Scores)	Mathematics 9 (Mean = 26.65 ± 8.15)							Mathematics 11 (Mean = 38.30 ± 10.30)						
	F	E	D	C	B	A	Total	F	E	D	C	B	A	Total
61													2	2
56											4	1	1	6
51								1		5	3	2	1	12
46				1			1	3		2	8	4	7	24
41				1		1	2	2		7	8	5	5	27
36	4		6	2	1	2	15	5		15	13	4	3	40
31	2		5	5		1	13	5		8	7	4	1	25
26	10	1	10	4	4		29	15		5	2	1		23
21	9	1	8	5	2	1	26	7		8	2			17
16	12		3	2		1	18	2		3				5
11	4	1	1	2			8	1	1					2
6	1						1							
1	1						1	1						
Total	43	3	33	22	7	6	114	41	1	53	47	21	20	183

Diagram I is a two-dimensional representation of the test score and fall quarter final grade for each of 297 freshmen enrolled in Mathematics 9 and 11. Under each letter grade are the number of students attaining that grade, located opposite the raw score they made on the Mathematics Training test. Thus, of the 43 students who received "F" in Mathematics 9, four scored 36 on the test, two scored 31, ten scored 26, etc.

There were only three persons in the Mathematics 9 group who scored above the mean of the Mathematics 11 group on

the training test. One of them received an "A," and the other two received grades of "O." All but six of those who scored above minus one standard deviation from the mean of the higher group received grades of D or higher. (11 received D, 9 C, 1 B, and 4 A.) Might not some of these students have done satisfactory work in Mathematics 11? Of the higher group, 24 students scored below the mean of the lower group. Of these, 10 failed, 1 was conditioned, 11 received grades of D, and 2 attained to C. Might not some of these students have profited more by having taken Mathematics 9?

DIAGRAM III.

FINAL GRADES IN CHEMISTRY COURSES COMPARED WITH CHEMISTRY APTITUDE TEST SCORES.

Number of cases = Chem. 14, — 61, Chem. 4, — 168.
Fall quarter, 1925.

Chemistry 14
(Mean = 61.85 ± 14.40)

Chemistry Aptitude Test (Raw Scores)	F	E	D	C	B	A	Total
96							0
91							0
86						1	1
81			1		2	1	4
76	1		1	2		2	5
71				3	1	1	5
66	1	1	4	4	3	1	14
61		1		1	2		4
56		1	2	2			5
51	2	1	1	2	1		7
46	5			1	1		7
41	1			1	1		3
36							0
31	4						4
26	1						1
21							0
Total	15	4	9	16	11	6	61

Chemistry 4
(Mean = 69.50 ± 13.55)

Chemistry Aptitude Test (Raw Scores)	F	E	D	C	B	A	Total
96					3	1	4
91			2	3	2	1	8
86			1	2	5	1	10
81	1		3	6	5	2	17
76	4	1	2	10	7		24
71	1	1	6		4	1	13
66	4	1	6	8	8		27
61	4	6	1	5	2		18
56	7	1	6	5			19
51	3	2	3	2			10
46	5		1	1	2		9
41	4		2				5
36			1				1
31	3						3
26							0
21							0
Total	36	12	34	42	38	6	168

The Chemistry courses which have very definite methods of classification, namely whether or not students have had high school chemistry, are composed of persons of differing abilities. This is reflected in the mean scores of the two groups. (Table II.) There is a difference between the mean scores of the two groups on the training test of one and one-third standard deviation of the distribution. (13.70.) Further comparisons may be made by inspecting Diagrams III and IV.

DIAGRAM IV.

FINAL GRADES IN CHEMISTRY COURSES COMPARED WITH CHEMISTRY TRAINING TEST SCORES.

Number of cases same as in Diagram III.
Fall quarter, 1925.

Chemistry 14
(Mean = 29.00 ± 21.70)

Chemistry Training Test (Raw Scores)	F	E	D	C	B	A	Total
151							
141							
131							
121							
111							
101							
91					1		1
81				1		1	2
71							0
61						1	1
51	1					1	2
41			1	2			3
31		1	2	5		2	10
21	5	2	5	2	8	1	23
11	5	1		4	1		11
01	4		1	2	1		8
Total	15	4	9	16	11	6	61

Chemistry 4
(Mean = 75.30 ± 32.00)

Chemistry Training Test (Raw Scores)	F	E	D	C	B	A	Total
151					1		1
141						1	1
131			1	1	1	2	5
121				1	5	1	7
111	1	1	1	4	4		11
101	2		1	4	1		8
91	1		1	4	5		11
81		1	3	6	6	1	17
71	2	1	8	6	3	1	21
61	7	5	7	6	5		30
51	8		3	6	4		21
41	9	3	3		2		17
31	3	1	4	2	1		21
21	3		1	2			6
11							0
01							0
Total	36	12	34	43	38	6	168

These diagrams represent the distribution of scores on the two chemistry tests in relation to grades received in the two courses in chemistry. On the training test, three in the Chem-

istry 14 class scored above the mean of the Chemistry 4 class, and they received an A, a B, and a C. On the other hand, six persons who took Chemistry 4 scored below the mean of the Chemistry 14 group. They received 3 grades of F, 1 D, and 2 Cs. Evidently the mere fact of having had high school chemistry does not preclude the possibility of ignorance of chemistry, nor does lack of credit in high school chemistry conclusively indicate a lack of knowledge of chemistry. Apparently there were some students in each course who would have profited more if they had taken the other course. This problem of classification is one for further study, and could be investigated in the same manner as the similar problem in the department of Mathematics, by giving comprehensive, objective examinations in mathematics or in chemistry to both low and high classes at the end of the course. It appears that greater accuracy in classification of freshmen in the departments of Mathematics and Chemistry would result from a supplementary use of the placement tests, particularly the training tests.

C. Sectioning of Classes on the Basis of Ability.

In large classes it is often desirable and profitable to section the students into homogeneous groups, isolating A and B students in one group, C students in another group, and D and F students in yet another group. A test, to be useful for sectioning of classes, must correlate to a fairly high degree with achievement (scholarship) in the particular course for which it is intended. It must reveal differences between students of different abilities. Coefficients of variability offer one index of the value of a test for these purposes. As has been stated above, all of the placement tests, with the possible exception of the English Aptitude test, have remarkably high coefficients of variability. (Table I.) Another criterion of a good test for these purposes is this; the revealed differences must be valid to the subject presumably measured. The English tests must show differences in knowledge of and aptitude

for English. The mathematics and chemistry tests must reveal differences in mathematical or chemical knowledge and aptitudes. A measure of the effectiveness of a test for these purposes is the degree of correlation of the test scores with final grades in the various courses. Table III presents the coefficients of correlation between the placement test scores and achievement in the various courses as represented by final grades received by students in those courses.

TABLE III.

COEFFICIENTS OF CORRELATION—TEST SCORES WITH FINAL GRADES IN SINGLE COURSES.*

Course.	Test.	1925.		1924.	
		Number of Cases.	r.	Number of Cases.	r.*
English 4.....	E.A.	303	+.54	320	+.46
English 4.....	E.T.	303	+.63	320	+.59
Mathematics 9.....	M.A.	114	+.36	170	+.26
Mathematics 9.....	M.T.	114	+.30	170	+.45
Mathematics 11.....	M.A.	183	+.41	160	+.36
Mathematics 11.....	M.T.	183	+.49	160	+.45
Chemistry 14.....	C.A.	61	+.56	74	+.39
Chemistry 14.....	C.T.	61	+.41	74	+.55
Chemistry 4.....	C.A.	168	+.57	170	+.48
Chemistry 4.....	C.T.	168	+.43	170	+.54

* Pearson coefficient of correlation.

Coefficients of correlation of +.45 and up between test scores and single courses indicate that good use may be made of the test scores for sectioning classes. The above coefficients range from +.26 for M.A. vs. grades in Mathematics 9, 1924, to +.63 for E.T. vs. grades in English 4, 1925. Diagrams V and VI reveal the extent to which actual predictions can be made under existent conditions.

DIAGRAM V.

FINAL GRADE IN ENGLISH 4, 1925 COMPARED WITH SCORE ON ENGLISH APTITUDE TEST.

English Aptitude Test* (Group Location)	Final Grade. F	E	D	C	B	A	Total	Number of Cases in Error. Deviation	Frequency
I				3	8	1	12	−4	2
II	2	1	12	19	13		47	−3	3
III	2	7	23	41	20		93	−2	28
IV	6	20	35	28	5		94	−1	78
V	8	22	15	9	1		45	0	107
VI	5	3	4				12	+1	66
Total	23	43	89	100	47	1	303	+2	18
								+3	1

* Corresponding coefficients obtained in 1926 are:

English 4	E.A. + .48
English 4	E.T. + .49
Mathematics 9	M.A. + .27
Mathematics 9	M.T. + .35
Mathematics 12	M.A. + .52
Mathematics 12	M.T. + .41
Chemistry 14	C.A. + .56
Chemistry 14	C.T. + .24
Chemistry 4	C.A. + .59
Chemistry 4	C.T. + .48

Actual achievement scores are arranged in the form of a normal probability distribution curve. But final grades in English 4 are very much skewed to the lower end of the scale. Since there are six grades, A to F, scores on the placement tests have been arranged in six groups, maintaining the original form of distribution. Whereas the topmost group in terms of test scores is composed of 4 per cent of the total group, only .3 per cent of the total group receive the highest grade, A. This unnatural skewing of the distribution of final grades lowers the predictive value of the tests because we are then trying to predict a skewed distribution of grades by an

DIAGRAM VI.

FINAL GRADE IN ENGLISH 4, 1925, COMPARED WITH SCORE ON ENGLISH TRAINING TEST.

English Training Test* (Group Location)	Final Grade. F	E	D	C	B	A	Total	Number of Cases in Error. Deviation	Frequency
I				4	8		12	−4	1
II	1		3	22	18	1	45	−3	2
III	2	5	31	38	18		94	−2	17
IV	5	18	37	30	3		93	−1	91
V	12	13	15	6			46	0	109
VI	3	7	3				13	+1	71
Total	23	43	89	100	47	1	303	+2	12
								+3	0

* Scores on the two tests are converted into "group location" for purposes of prognosis. Since the raw scores approximate a "normal curve" the groups are arranged accordingly on the basis of standard deviation scores.

Group	I	contains the upper.....	4%	of	cases
"	II	" " next.....	15%	"	"
"	III	" " "	31%	"	"
"	IV	" " "	31%	"	"
"	V	" " "	15%	"	"
"	VI	" " "	4%	"	"

instrument which shows a normal distribution of scores. But even under these conditions, on the basis of test scores, (E.T.), out of 303 freshmen who took the test and were registered in English 4, 109 were located without error, 162 were located within one step of their final grade, 29 within two steps, 14 within three steps, and only one student received a grade four steps from that predicted for him. Eighty-three students did better work than the tests scores indicated they would do, and 111 received lower grades than were predicted for them. The aptitude test was somewhat less effective.

Diagrams I and II (pp. 846, 847) show the effectiveness of the mathematics tests as predictive devices of scholarship in

the two mathematics courses. It appears that for these groups the training test is more effective for classifying the students into the two classes, but that within either class the aptitude test is more effective for predicting final grades, and hence is better adapted for use in sectioning on the basis of ability. The same result was obtained in the chemistry department. (See Diagrams III and IV, pp. 848, 849.) These conclusions were arrived at because of the differences in mean scores of the different groups on the training and aptitude tests, and because of the relative size of correlation coefficients as presented in Table III, 1925. There is evidence, however, that the differences in favor of the aptitude tests in 1925 and 1926 are due to the time of giving the examinations.

As stated above, the 1925 and 1926 tests were administered before the beginning of class work, whereas the 1924 tests were administered later. In 1925 correlations between training tests in mathematics and in chemistry and final grades in the related courses are lower, with one exception than they were in 1924, but the aptitude test correlations are increased in 1925 over 1924. Probably, if the 1925 tests had been given after the beginning of class work the training tests would have been relatively more effective than the aptitude tests as they were in 1924. At any rate, scores made on training tests after the persons to be tested have had an opportunity for a short review, apparently are more reliable and accurate as measures of a student's achievement than are scores made on such tests when they are administered before the student has had an opportunity for a short review.[5]

A summary of the above findings shows that the Iowa placement examinations can be used effectively for sectioning classes on the basis of ability, particularly when the training tests in the more technical subjects, (mathematics and chemistry) are administered after the students have been given an opportunity for a short review of the subject matter.

[5] This point has been set forth in a short article published in *School and Society* for Nov. 13, 1926, Vol. XXIV, No. 620. T. A. Langlie, "The Administration of Placement Examinations."

D. Administrative Use of the Placement Tests.

As long as the student body of the University is recruited from any and all high school graduates there are bound to be numerous cases of failure to do satisfactory work in college. The sooner students or prospective students are acquainted with the facts concerning their chances for doing satisfactory college work the sooner will waste energy be eliminated. It is a genuine service to young men who plan careers in engineering work to acquaint them with their disabilities. The question is one of certainty of results, and that is determined by correlation studies of the test scores and scholarship. If any test score is critical, *i.e.*, if nobody scoring below a certain score succeeds, that test is very valuable for weeding out certain failures before they are allowed to waste their time and money and the money of the State. Such discriminatory action is not allowed as yet in most tax supported schools, but the information derived from such a test can be used very effectively in selecting students for probation and for advisory purposes generally. Table IV present coefficients of correlation between each test and scholarship as measured by

TABLE IV.

Coefficients of Correlation between the Various Tests and Scholarship.

(Scholarship is measured by number of Honor Points gained during first quarter at the University.)

Test.	r with Total Scholarship.*		
	1924 (N = 241).	1925 (N = 242).	1926† (N = 202).
English Aptitude	+.39	+.41	.37
English Training	+.44	+.48	.39
Mathematics Aptitude	+.47	+.57	.60
Mathematics Training	+.54	+.61	.68
Chemistry Aptitude	+.44	+.51	.58
Chemistry Training	+.40	+.29	.35

* Pearson coefficient of correlation.

† College of Engineering only.

the number of "honor points"[6] earned during the first quarter.

The best single test for purposes of predicting scholastic achievement is the Mathematics training test which correlates +.61 (1925) and +.68 (1926) with total "honor points." Diagram VII shows this relationship (+.61).

DIAGRAM VII.

TOTAL SCHOLARSHIP (FALL QUARTER, 1925) AS REPRESENTED BY "HONOR POINTS," COMPARED WITH SCORES ON THE MATHEMATICS TRAINING TEST.

N = 242. r = +.61.

Mathematics Training Test (Raw Scores)	Number of Honor Points.													
	−15	−10	−05	00	05	10	15	20	25	30	35	40	45	Total
61									1		1			2
56							1	1	1		2			5
51					1	3		1	3	2				10
46				3		2	2	7	3		5		1	23
41				1	1	3	4	3	3	4	2	1	1	23
36		3	1	5	7	6	4	8	4	2	1			41
31			5	1	11	2	4	4	3		1			31
26	2	1	9	9	12	7	3			1				44
21	1	1	8	5	8	5	4	2	1					35
16	1	4	8	1	1	1	1	2						19
11	1	1	2	1	2									7
06			1											1
01			1											1
Total	5	10	35	26	43	29	23	28	19	9	12	1	2	242

Nobody scoring below 15 on the Mathematics Training test succeeded in maintaining a C average during their first quarter at the University. As students score higher on this test their chances of succeeding in engineering work, by which

[6] "Honor Points" are used to give a quantitative as well as qualitative index of scholastic achievement. Grades are weighted as follows for the purposes of this study: F, −1; E, −.5; D, 0; C. +1; B, +2; A, +3.

I mean scholarship, is increased. Individual predictions cannot be made on the basis of test scores on any one test or group of tests, but the probabilities of predicting a student's success or failure accurately are greatly increased when the predictions are made on the basis of their scores on these tests. The mathematically constructed tests are superior to the linguistic tests in this respect. Thus MT, MA, and CA correlate + .61, + .57, and + .51 respectively with total scholarship in contrast to + .41, + .48, and + .29 for EA, ET, and CT, respectively. The low correlation of + .29 between scholarship and the chemistry training test is due to the elementary chemistry course, Chemistry 14, which yields 5 credits. A student may know little or no chemistry and yet get a satisfactory grade in Chemistry 14. This course contributes a large portion to the scholastic index (5 credits) and hence those who score low on the test but do good work bring down the coefficient of correlation. Furthermore, the lower correlation may be due in part to the improvements which have been made in the test from 1924 to 1925. Formerly the test measured more of general intelligence, correlating to a fairly high degree with the other tests and scholarship. The new edition is more highly specialized and, accordingly, correlates to a lesser degree with total scholarship.

In line with the results given in part "C" above, we may assume that the training tests would have correlated even more closely with scholarship had they been given about two weeks after the beginning of classes. The test scores of those students who did satisfactory work but scored low on the different tests would have been higher. In other words, a more reliable "critical" point might have been found due to greater reliability and validity of test scores. Likewise, it is a certainty that if scholarship were more reliable and more objective, predictions could be made much more accurately than is possible at present.

Attempting to predict scholarship as it is at present is like trying to hit a moving target. The gun (test) is well stabilized and very satisfactory, but "grades" continue unstabi-

lized. Objective examinations [7] where possible would do much to increase the stability or reliability of course grades. In individual courses, coefficients of correlation between predictive tests and final grades have risen as much as 14 points with the introduction of objective final examinations. At the University of Minnesota, College of Science, Literature, and the Arts the following improvements in prediction have resulted from the introduction of objective examinations. (Final grades *vs.* College Ability test.[8, 9])

	History.	English.	Biology.
No objective examinations	+.29	+.40	+.40
Objective examinations	+.43	+.51	+.53

The matter of unreliability of scholarship indices cannot be stressed too strongly. Whereas the Iowa Placement Examinations enable administrative officers to deal differentially with the various types of students, we are yet a long way from perfect prediction, due to lack of measures of all traits which go to constitute a good student, and probably as important, if not more so, due to the unreliability of that which we wish to predict, namely scholastic grades. With increased reliability of grades will go increased reliability and accuracy of prediction.

[7] See Wood, Ben D.: "Measurement in Higher Education." World Book Company.

Toops, H. A.: "Trade Tests in Education." Teachers College of Columbia.

Ruch, G. M.: "Improvement of the Written Examination." Scott, Foresman Company.

Paterson, Donald G.: "Preparation and Use of New Type Examinations, a Manual for Teachers." World Book Company.

[8] For a description of these tests see Johnston, J. B.: "Predicting Success or Failure at the Time of Entrance." *School and Society*, Vol. XIX, Nos. 496 and 497, June 28 and July 5, 1924.

[9] Paterson, Donald G. and Langlie, T. A.: Unpublished research data.

Summary.

1. The placement tests reveal individual differences to an unusually high degree, coefficients of variability being above .30 for all but two tests, E.A., —.18, and C.A., —.22. The 1925 edition is greatly improved over the 1924 edition in this respect.

2. As a check on the classification of students in the mathematics and chemistry departments, the training tests are more effective than are the aptitude tests. The different courses in these departments are composed of fairly homogeneous groups of students, each group being different from the other as far as these special abilities are concerned. Further studies of this problem should be carried out.

3. Sectioning classes on the basis of ability could be done fairly successfully with scores on the aptitude and training tests as guides. English classes in particular could be sectioned on the basis of ability with a minimum of error. More than 33 per cent of the grades of English classes (1925) were predicted exactly, this with scores on the English training test alone ($r = +.63$). Sectioning in the mathematics and chemistry departments probably could have been done with almost equal accuracy if the training tests had been administered at a later date, when the students would have had an opportunity for a short review.

4. The placement tests yield valuable information for administrative purposes such as personnel work, students' work committees, and advisory work. Encouragement and discouragement of continued study at the University can be done much more accurately when test scores are used as a guide than when scholarship and impressions alone are considered. Students' time and money, and the money of the State could be saved by careful and wise use of test scores in educational guidance work with High School Seniors as well as special advisory work with students during the early part of the freshman year.

The use of information gained from test scores would be

much more effective and accurate if scholastic grades were made more reliable and objective. The tests are satisfactory as prognostic and diagnostic devices, having the power to reveal individual differences in ability and capacity to a high degree. Further work in the direction of improving the tests will not yield increasing returns until "grades" are made more reliable. The next step should be the improvement in reliability and objectivity of examining procedures. Increased objectivity of grades will then be followed by increased accuracy of prediction.

The added study of these tests for the fall quarter of 1926 supports the conclusions arrived at by the 1924 and 1925 study. Changes in Coefficients of Correlation are due to the unreliability of small groups and because engineering freshmen alone were used in the added study.

COOPERATION AND THE UNIVERSITY STUDENT.

BY F. C. FRENCH,
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The problem which confronts the high-school graduate, pondering the question of whether to continue seeking an education, or to turn down the pathway of business, is a serious one and worthy of careful and painstaking consideration.

No satisfactory decision can be reached until an exhaustive self-analysis has been made, and many questions definitely answered, questions which the average high-school graduate has perhaps never thought of, to say nothing of answering.

How many of you can, or could, on the day of graduation from high school, answer the question, "What do I most want to do as a life work?" and answer without many mental reservations and much self-evasion.

If you cannot answer that question, how can you expect to take the next step toward success in life, or make a decision which is going to involve the next four or five years of effort and no small amount of capital expenditure?

If you can or did answer it, are you satisfied with the answer, or do you have some vague misgivings as to the foundation of your decision?

Suppose that you have answered that you want to become an engineer, can you justify that decision before a searching inquiry? Have you stopped to consider that as an eminent engineer the chances are that you will live in comparative obscurity throughout your life as compared to equal success as a doctor, lawyer, banker, manufacturer or merchant?

What man has not heard of The Mayo Brothers, J. P. Morgan, Henry Ford, Marshall Field and hundreds of others whose names are as familiar as breakfast food?

Now pause a moment. What engineers have made their names as well known? Who built the Panama Canal? Per-

haps one out of four can answer. Who built the Brooklyn Bridge? Who built the Chicago Drainage Canal? Who built any notable engineering structure that can be mentioned? Not one out of 100 high-school graduates can answer. What have you weighed against this probable oblivion, as far as public recognition or personal honor is concerned, in your determination to become an engineer?

Has your decision to become an engineer been based upon a desire for a high salary, a longing for great wealth, or a love for the things which money can buy? I see the cynical smile or hear the audible laughter of every engineer to whom such a question is propounded. The answer, coming from a representative cross section of the engineering profession should convince you that if such a conclusion has been reached, it was reached upon erroneous information.

Did you reach your decision upon information that an engineering education would be the best training for a successful business career? If so, you probably overlooked the fact that there appears to be a natural conspiracy to sidetrack the commercial instincts in the engineering profession. The very fascination of the work of engineering is such as to leave very little desire on the part of engineers for the details of business so necessary for commercial success, or at least that conclusion has been reached by a majority of the investigators, who have been trying to find the real value of a technical education as a basis for business success.

If this conclusion is correct, or justified by the facts, are such conditions desirable? Should the fascination of engineering be fostered and built up as the main reason for a decision to select engineering as a field for life work?

If you can look at the scales representing life, heap into the balance on one side, all the satisfaction possible to derive from wealth, power, social position and public trust. Place in the other side the fascination of creating things by the efforts of head and hands, add to that the satisfaction of doing well, with a minimum of expense, that which anyone might do, after a fashion, in case expense were not a consideration. Then, if in

your vision the scales balance or lean to the creation side, you may well think of choosing engineering.

But wait! The decision is not yet! Shortly you will assume the obligations of a wife and family. The glamour of high boots and flannel shirt appeal to the romantic. Romance of profession lives long and dies hard, yet it is mortal and mortals die. Weigh well the possibility of having to apply artificial respiration to this fascination of profession, in the face of a loving and hardworking wife, who is mother to your needy and thoughtful children.

The world is perhaps all too familiar with installment buying and there are usually only a certain definite number of payments. How many installments do you want to make on the price you pay for the romance of engineering before you will feel that the article you are paying for has worn out, or that you are paying for the dead horse.

Suppose your boyhood friend and classmate, who chooses to acquire the commercial instincts of manufacturing, along with his engineering, for instance, takes up an article on which you have spent years of time in developing and perfecting. His attention to commercial detail, his knowledge of advertising, marketing and the general business situation permit him to create a demand and make a market for this article in such quantity that there is a large profit to him in its manufacture.

Your friendship of years ripens, your wives are great chums, and for a time nothing mars the youthful satisfaction in this friendship.

Financial success creates new fields and new friends for him. New developments bring new engineers with new schemes to his immediate attention. New social obligations deprive his wife and family of some of the time previously so happily spent with you and yours. Your determination to hold up your end or not participate cause you to cut down on the social side and you gradually drift apart. Continued succes carries him on and away from you and his former associates. Does your wife get sufficient satisfaction from the romance of engineering to repay her for these losses which financial con-

siderations have forced upon her? Does she weigh the situation and wonder whether you have the ability to make a financial success if you would only try? Does she wonder when the last installment on this romance will have been met? These things should be given weight.

Your children are brought up in an atmosphere which is not conducive to commercial success. Your home conversation is not of money getting, but of the creation of new things, labor-saving devices, schemes for lightening the drudgery of the home or increasing the output of the factory with a decrease of man power, plans for bridging this canyon or tunnelling that mountain. What chance has your son, brought up in this atmosphere, to make a financial success, in competition with a boy who has since childhood absorbed the technique of stocks and bonds, the capitalization of vast enterprises, the tremendous profits of consolidations and the fortunes made in promotions? Is such a handicap to posterity any part of the price you pay for romance?

I hear the mothers and fathers, who have been reared in educated fields, and who have brought their sons thus far in an atmosphere of refinement, commence to hiss. "Low brow stuff! The argument of a worshipper of Mammon!" The hems of their garments are drawn back lest they be defiled.

Let's look at this attitude. Why has it grown up and what gave it birth? There seems to be no foundation for this thought in the declaration that all men are created free and equal, or in that all are guaranteed life, liberty and the pursuit of happiness.

Can you search the constitution and find, anywhere, that the possession of money is deplored or that its acquisition is frowned upon? Does the pursuit of happiness mean that you must pursue in certain definite channels, as laid down and defined by any creed, caste or commission?

If not, then do you assume that the manufacturer, the banker, the promoter or any of the low brow callings do not take a considerable enjoyment from their activities as well as accumulate money?

Whence comes the ingrown habit of looking down upon the commercial sense simply because its reward is measured in dollars and is proportional to the brain power and physical effort expended.

Is there any reason for the assumption of romance in engineering and the lack of it in commerce, or a monopoly of high ideals and personal satisfaction in work well done on the one hand, and a lack of these things on the other?

Is it not far fetched to assume that the successful business man does not play the game largely for the love of it? That the money he may accumulate in its playing is the main reward of his efforts? That he would not continue to play for the thrill and excitement of playing even though the dollar measure of his success had dwindled to an equivalent of the rewards of engineering?

Can we say that a son brought up in an atmosphere of stocks and bonds, of promotion, consolidation, flotations and mergers cannot also have absorbed at the same fireside the intangible satisfaction of the rewards of service, service to country, state and community, and the knowledge that such satisfaction can be measured only in magnitude of service rendered?

Is there reason to assume that this son may not have had kindled in his mind's eye, by the example of his father, the fires which will warm his heart and brighten his future life, even though that father had gathered many dollars by his efforts?

Was this fair country developed to its present state by a love of culture or a hope of profit? Did its discoverer, even, have the idea that he was broadening the field for culture, or was a short road to the riches of India his driving motive?

Our great universities have at last begun to listen to these questions and have answered by opening schools of Business Administration, but is this the answer?

Is it more bookkeeping, stenography or economics which the university student needs, or is it a general awakening to the needs and equipment necessary for the college graduate to

have in order to make more rapid progress in the battle of life, regardless of the field of activity chosen.

What is the student up against on the day of graduation? What will he have done during the period of his college course to prepare him to solve that problem? What will he have added to his equipment, mental, moral and physical, which will aid him in the battle of life, and make his progress through the waters of world competition more rapid and steady and beset with fewer dangers of swamping in the whirlpools of uncertainty?

Who in our universities is laying a kindly hand on the shoulder of the high-school graduate and saying: "Here, young man, this is the problem. Four years from now you will face these conditions and you will need this equipment in case you decide to take this road to success. Business is War, with the glory left out, and Sherman's definition of War lacks a little something in adjective.

Who in our universities is competent to do this little stunt and take the professional man's satisfaction in its doing? Who can do it and feel the reward of service well rendered and a job well done?

Let's examine for a moment the report of the Society for the Promotion of Engineering Education, on The Study of Engineering Teaching Personnel, and we find that 87.5 per cent of the Deans, 74.3 per cent of the Professors and 79.8 per cent of the Associate Professors of the institutions examined were either promoted from the lower grades or from the staff of another institution. Such being the case, we might conclude that in something like 6 per cent of our universities and technical schools, a student might be advised, as to his problems and the necessary equipment for solving them, by a man having had actual personal contact with these problems without calling upon outside assistance for such advice.

Is a man whose selection has been, in 94 cases out of every 100, from a field having little contact with the field of business, whose lack of taste for the things common to industry led him to take up the teaching profession, whose environ-

ment, during his teaching career, has been such as to foster his love for the academic and shun the things which alone could qualify him for this duty of which we speak, and whose staff has been picked from the only available source (the same one from which he grew)—is such a man, I repeat, qualified to tell the prospective college student, the high-school graduate, just what problems he will be up against on the day in which he reaches for his college diploma, on the one hand, and comes to grip with a heartless world competition on the other? I leave the answer to you.

How, then, can the proper advice be given to prospective students in our universities? The answer is by cooperation with our industries. How can the proper instruction be given, in our universities, to fit the prospective students for mastering the problems he will encounter on the day of graduation? The answer is by cooperative courses of instruction.

There is nothing more, academic, which the college graduate needs on this day of days. The vital factor, still lacking in so many, is a general and intimate knowledge of the world of business, its desires, its demands, and the rewards held out to the deserving who can satisfy its needs.

Must a college graduate spend from a year to two years more in an apprenticeship course in industry, spurred by his ambition, buoyed up by his high ideals and his code of ethics, which are admittedly above the average, while he is ground down by the horrors of the hash house, his contact with the grime of manual labor and the thought that he is daily laying aside habits which he strove for four years to cultivate?

Must he be forced to make the mental comparison between himself and his neighbor who was forced by economic pressure into the rôle of mechanic instead of going to college from high school? Must he see this man as a foreman or subforeman in the shop in which he is apprenticed, enjoying the confidence of the other mechanics, while he is ignored or looked upon with suspicion? Must he know that this man's pay check enables him to support his wife and family in comparative comfort while he can barely make his own ends meet on

his apprentice wage? Must he ask himself: "Why didn't I know this before? Was it not the first duty of higher education to point these things out to me, before I entered my Alma Mater? Does the fact of my being forced to find the answer to these questions from my own bitter experiences make my love for the Alma Mater stronger? Has it helped me in any way, and if so, what?"

Suppose that the high-school graduate could have had a heart to heart talk with a man who knew all about the requirements of the field which the student proposed to enter. A man who could have said authoritatively: "These are the requirements, mental, moral, physical and temperamental. Here are the advantages. There lie the drawbacks and stumbling blocks in detail. This is the short road to success, at the end of which hang the fruits which are the reward of the effort." Would he not have had a tremendous advantage?

The short road is steep, requires untiring effort and a determination to neglect nothing in the way of a foothold on the way to the summit.

Neglecting nothing means the employment of vacation periods in work along the lines of desired professional experience, the taking of courses leading to proficiency in the chosen field, rather than those easily passed and the acquiring of a set of habits which will fit into the scheme of this field, instead of the more common and expensive set so commonly taken on by the undergraduate.

How many college graduates stand the gaff of an apprenticeship course until success rewards their efforts? Statistics are not available, but the percentage is small indeed, and these results are as discouraging to industry as to the graduate.

Industry also is confronted with the feeling that old employees are discriminated against by a college graduate apprenticeship, and that outsiders are being pushed into positions which they ought to hold, in case they can qualify for them, which, coupled with the high percentage of turnover in these courses, makes the cost per permanent employee for industry proportionally high.

It is a generally recognized fact that several men when heartily cooperating, even if these men be of everyday caliber, can accomplish in a given time more than is possible for any one man in the same time, regardless of his caliber and ability.

Great accomplishments of individual men are heard of less frequently than formerly, and as stated by F. W. Taylor, "The time is coming when all great things will be done by the cooperation of many men in which each performs that function for which he is best suited, each preserving his own individuality and supreme in his particular function and each losing none of his originality and proper personal initiative, yet controlled by and working harmoniously with many other men."

Cooperation seems to be the watchword and panacea for these ills and it is gratifying to see how quickly the foremost universities respond to anything which offers a solution to their problems.

Schools of Business Administration are organized. Prominent, successful business men are called in to present their problems to the young men embarking on a business career. Instructors are encouraged to consult, mingle with, question and discuss with business men the needs of business and of the university. The universities are profiting, to an extent which is measured only by their activities along these lines and the cooperative interest which they can arouse in industry.

This is good, but it is not enough. Having two arms, a university may reach in both directions. If this meat upon which Cæsar feeds causes him to grow great, why not the high school as well?

Let's bend the twig instead of breaking the branch and have the high-school principals in on our cooperation. Let's imbue their minds with the thought that the end of education is to fit a man for the trials of life, and that the trials are the same regardless of the pathway followed. Hence the high school is as deeply interested in the steps leading from its doors, whether they be the broad ones down which the ninety pass to the world of affairs, or the narrow ones up which the nine climb to the university.

We all admit that there is no single road to success and the most of us agree that all roads are cut up with many ruts. The road through the world from high school offers the first fruits of effort, although the total gatherings may be less and of inferior quality to that along the route by way of the university. The university road is long and winding and the fruits are deferred four or five years later, but the quality is better and the quantity is greater and the gleaners less in number as one draws nearer the end of the road.

Either way the trials are the same, and only the outfit and equipment for travel differ.

Why, then, should not the high-school graduates be impressed with the facts, regardless of his choice of direction? Why not take the high school principal into the cooperative relations between the university and industry, and reap a double profit by this interchange of ideas and growing knowledge of the needs of industry? Why should high schools not bend their efforts to equip all of their graduates with a knowledge of the stumbling blocks in the paths of progress and the lines of least resistance around them?

Cooperation is good and its principles are of universal application in education, as well as other things, and only the best methods of applying it to our needs are debatable.

Here at Marquette University College of Engineering we have swallowed the hook, line and sinker and have adopted the Cincinnati idea in all of our engineering courses, and this policy has proven highly satisfactory through eight years of operation.

The details of its application have been modified from time to time, and the perfection of these details are manifest by the steady and rapid growth of our student body, the satisfaction of our cooperating firms in the arrangement, the demands of these firms for more students, and the ever lessening number of complaints coming from either students or firms.

The method of the application of this idea to a university is very interesting, but that in itself is another story.

LABORATORY INSTRUCTION IN THE DEPARTMENT OF MECHANICAL AND ELECTRICAL ENGINEERING OF THE UNIVERSITY OF CALIFORNIA.

BY BLAKE R. VANLEER,

Assistant Professor of Mechanical Engineering.

Mass instruction is employed to a large extent in the Department of Mechanical and Electrical Engineering of the University of California. That is, a professor lectures to a large group, one hundred or more students, in all of the major fundamental engineering subjects. Problems are assigned but there are no quiz sections. As a result the student has to rely for personal instruction upon his contact with the instructors in the laboratories, more than in most institutions where classes are divided into small groups for quiz purposes. Because of this unusual situation, laboratory instruction in the College of Mechanics has assumed a peculiar importance. The manner in which the problems have been solved are set forth below for the benefit of those who are having to meet similar problems in other institutions where the increase in the number of students desiring a technical education has forced the faculty to try new methods.

The system of instruction in use in the Electrical, Heat Power Engineering, Hydraulic and Automotive laboratories of the University of California is not the result of the work of any one man but is rather the outgrowth of the old system and the labors of a committee composed of instructors and professors in the college. Those who contributed most to the work were Prof. L. M. K. Boelter, Prof. T. C. McFarland, Prof. G. L. Greves, Prof. D. D. Davis and the author of this paper. The method herein set forth is not perfect but it is giving satisfactory results and is infinitely superior to anything that has yet been tried.

Laboratory Work.

Every effort is made to throw responsibility upon the student. He must make his own piping and wiring diagrams, his original data sheets which are checked by the instructor. The student himself connects and places the instruments and conducts the test. This gives him more training and experience than is obtained in laboratories where the instructor or an assistant "sets up" the apparatus and all that is required of the student is that he take the data, frequently upon form data sheets which have been prepared for him.

The usual procedure of dividing the students into sections of from 12 to 24 in number is followed and these sections are in turn divided into parties of from 3 to 5 students. There are slight variations in this regard between the Electrical Laboratory, the Heat Power Engineering Laboratories and the Hydraulic Laboratory, because the experiments in some cases are more complicated and require more observers. In the Hydraulic Laboratory parties as large as five are not permitted. In the Heat Power Laboratory, popularly known as "The Steam Lab," after a student has demonstrated his ability to carry on good laboratory work he is permitted to select the experiments which he desires to perform. The number and type of selections permitted are dependent upon the grade the student has received in his previous laboratory work. The number of good worthwhile experiments in all the laboratories greatly exceeds the time available for their performance, hence some must be omitted. A certain amount of freedom is permitted the student during the last semester of his senior year in all of the laboratories.

Emphasis is also placed upon teaching the student to observe carefully while in the laboratories, details of mechanical construction and the application of theory to the construction of apparatus.

Laboratory Grading.

The amount of laboratory work which a student takes is largely dependent upon the course he elects and there are so

many variations that it is impossible in an article of this kind to discuss that subject in detail, however, as a general rule students in Mechanical Engineering take the following laboratory work:

Laboratory.	Units.
Heat Power Engineering	6
Hydraulic (Inst. and Mach.)	4
Electrical	2
Total	12

and the students in Electrical Engineering take:

Laboratory.	Units.
Heat Power Engineering	2
Hydraulic	2
Electrical	8
Total	12

There are no final examinations in these laboratory courses and a student's grade is determined by his report grade, his leadership report grade and his laboratory grade. The grade he receives upon his report, and his leadership report are generally averaged together and amount to 60 per cent of his grade for the semester; these will be discussed in detail later.

The Laboratory Grade.

At the end of each laboratory period an effort is made to grade each student upon the following items:

1. Preparation.
2. Method of Attack.
3. Mechanical Ability.
4. Initiative and Leadership.

It is of course difficult to place an exact numerical valuation upon each of the items, however, the fact that a student is aware that an effort is being made to grade him stimulates him to do his best in all of these things. Also the fact that an in-

structor must grade each student compels him to keep close supervision of the students under him and to talk to them about the experiment and their work connected with it.

Preparation.

The grade under this item is determined by a student's familiarity with the theory and principles involved in the assignment, his knowledge of the test conditions, his readiness to start when the laboratory period begins and if he is leader of the party the completeness of his report and the punctuality with which it is presented are taken into consideration.

Method.

Here a student's grade is largely determined by the system and confidence which he displays in performing each task. His judgment and common sense, the despatch with which the apparatus is set up, and the runs made, are also taken into consideration.

Mechanical Ability.

A student may have planned his work carefully and may have a correct "Method of Attack" but he may bungle the job because he has not an aptitude toward machinery. This item takes into consideration a student's ability to judge the proper use of apparatus, to secure the maximum accuracy consistent with the desired results, his ability to place the instruments in the proper location to secure the data desired, his ability to handle the apparatus without breakage, and finally the cleanliness of the instruments and the apparatus station at the conclusion of the laboratory period.

Initiative and Leadership.

This is the key note to all laboratory instruction in the college of Mechanics at the University of California. Every student must show some ability as an efficient leader, and each member must be prepared to take hold in the absence of the leader, and each student must display some individual effort

tending toward the successful completion of the experiment. In addition the leader of the party must so arrange the duties of the party members that all become familiar with all parts of the test, and he must direct the party so that it is an efficient unit.

Leadership Training.

In order that the maximum of training in leadership and initiative may be had, each party or group has a leader for every experiment. The students in a party become leaders by alphabetic rotation. In order to impress upon the students the fact that leaders, those who plan and direct work, merit a higher compensation than those who merely do as they are told, the leader is given an extra grade upon his leaders report which is averaged in with the grades he receives upon his regular reports. He is thus obviously better paid because the time he spends upon a regular report varies from 11 to 16 hours while the time he spends upon his leaders report ranges from 3 to 6 hours.

Leader's Duties.

It is the duty of the leader of an experiment to hand in two weeks before the performance of an experiment a brief preliminary report which contains, the object of the experiment, an explanation of the method followed, a brief description of the apparatus, a statement of the formulas involved, a proposed schedule of the work with party apportionment, a sample data sheet, a list of tools required, a wiring diagram, or sketch of the piping showing location of valves, pumps, instruments, etc. Such a report must be handed in before the party is qualified to proceed.

The leader is held responsible for the day's work and he must check out all tools and instruments and see that they are properly returned. At the close of the period he notes upon the data sheet a summary of the work showing time required for setting up, taking data, etc. Finally he places in his leaders report a copy of the original data sheet after it has been approved by the instructor in charge of the laboratory.

Leader's Report Grading.

For the above work an arbitrary but generally fair scheme of grading a leaders report has been adopted as shown below.

	Per Cent.
1. Form, neatness, etc.	5
2. List of apparatus	10
3. Description of apparatus	5
4. Method to be followed	10
5. Principles and formulas involved	10
6. Piping or wiring diagram	10
7. Sample data sheet	10
8. Assignment of party, schedule	10
9. Readiness to start	10
10. Initiative and leadership	10
11. Original data sheet	10
Total	100

RECORD.

In order to accomplish the things set forth above a very careful system of records must be kept. This means a small amount of additional work upon the part of the instructors in the laboratories, but this is necessary where mass instruction is employed in the lecture rooms and where individual instruction is expected from the laboratory instructors. In order, however, to lighten this bookkeeping work as much as possible, the form shown below has been devised. This form is self-explanatory.

LABORATORY REPORT FORMS.

To further systematize and facilitate the work of the students in the laboratories of the department of Mechanical and Electrical Engineering, all reports are required to be bound in a manila folder.

Most of the information is required for academic reasons, but it greatly assists also in teaching the students, order, system and thoroughness.

Some of the details of the "Report Form" are necessary for

academic and pedagogical reasons, but in general it follows the accepted form used in the best technical and commercial reports of the day. Attention is again directed to the valuable training given in order, system and thoroughness which are the fundamentals of all reliable laboratory work.

ENGLISH.

In recent years many complaints have been heard that engineering students do not receive sufficient training and practice in writing and clear English expression. The report form

University of California *Mechanical and Electrical Engineering*

LABORATORY RECORD SHEET.

Chk. & Rct. No.	Name	Party No.		Sec. No.		Course		Aug.–Dec. 19.. Jan.–May									
		Week No.			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Experiment No.	Rep. Av.																	
		Date performed																		
		Date returned or due																		
		Days late																		
		Total hours work																		
		Leader's report	Lab. Av.	Final Gd.																
		Experiment grade																		
		Preparation																		
		Method of attack																		
		Leadership																		
		Mechanical ability																		
		Laboratory grade																		

shows that each student is required in every report to make use of the following types of expression:

1. *Letter Composition.*—Each report must be accompanied by a letter of submittal, which must be a formal letter addressed to the instructor and contain the usual conventional introductory paragraph, a concise summary of results and any recommendations or criticisms.

2. *Description.*—Each report must contain a written description of the principal machine and instruments used.

3. *Narration.*—Each report must contain a resumé of laboratory procedure.

4. *Argumentation.*—Each report must contain a complete discussion of principles, formulæ, curves, results, etc.

5. *Summarization.*—Each report is required to have at the end definite and concise conclusions based upon the results obtained. This trains the students in clarity and brevity. Here no arguments will be found, only the essence of all the work performed.

The Correction and Grade Sheet.

Following the report proper is the original data sheet which is put in for record purposes and to enable the instructor to see that the results were correctly calculated from the data actually taken. Next and finally comes the correction and grade sheet, which is required to facilitate the grading of the reports and also to show the students wherein their reports were deficient. The method of weighting the various parts of the reports is of course arbitrary and has to be changed for some reports, however, several years of use has proven that on the whole it is fair and satisfactory.

Extended discussion could be made of many of the points required. It is sufficient to point out one very important item, "Accuracy and Errors." Students are taught that the value of any report depends upon its accuracy, and they are required to note the precision of their instruments, to calculate the error where possible and at all times to exercise their judgments in this matter.

Results and Conclusions.

This system of laboratory instruction has been in use in the department of Mechanical and Electrical Engineering of the University of California for over five years, with slight modifications from year to year and it has proven satisfactory to both students and Faculty. The results accomplished may be summarized as follows:

1. The present laboratory system replaces in the most satisfactory manner the old quiz sections and recitation classes without loss to the student in personal contact with the instructors.

2. This system affords excellent training in the practical application of the fundamental laws of engineering, in the preparation of engineering reports, and in the planning and conducting of experimental tests.

3. A great deal of practice is given students in written expression.

4. It is excellent in training students in system, order, and thoroughness.

5. Finally, it is believed this system is unexcelled in developing in engineering students initiative and leadership.

THE TOUCH SYSTEM.

BY C. RALPH BENNETT,

Department of English, School of Applied Arts,
University of Cincinnati.

Once upon a time I sat in a freshman English course. The radiator in that sleepy, overheated classroom grumbled perpetually. My instructor quite awed us—his forehead was high and white and glistening, and he was very sarcastic. And he flooded red ink lavishly over my ambitious themes. Every effort of mine returned each week as a scheme in blue and red. I felt myself misunderstood, and persecuted, and thoroughly outraged. But that red ink has taught me something.

From my high school English courses I had gained the impression that I "wrote well." I thought I had ideas. I brought a vast boyish enthusiasm to that first college course. I worked hard over those themes. They always returned to me decorated with mysterious, burning, carmine comments. No real explanation, no actual help toward making them better themes—just some red strokes and a shameful grade. Right then and there I decided that if I should ever teach college composition I should never write a comment on a student's theme; I should discuss each theme with the student in my office. I did become an English teacher, and I have never written a comment on a theme.

When I came west to teach, in the English department of the College of Engineering and Architecture in a mid-western university, I found that the very system I had longed for was practised by my colleagues. Every student in our freshman course was required to confer with his instructor each week throughout the year, on every theme. Here was my ideal. I settled down comfortably.

But our student numbers grew. The middle west recovered

its prosperity, the radio craze swept America, and more students came to this College of Engineering. My fifty students grew to a hundred—a hundred ten-minute theme conferences a week. My colleagues decided to abandon the plan of personal conferences and to grade and comment on their themes at home. I persevered and I still maintain my schedule. Each of my students has his definite conference period each week, a ten-minute theme-judging time. He sits at my elbow —I read his theme and grade it—we talk it over together, while I explain to him its merits and its weaknesses, and suggest improvements—perhaps a new way of approach, perhaps a new kind of subject matter. The system works perfectly.

Of course, all of this takes time. But it has brought, I think, distinct results. My freshman engineers and architects have written me splendid themes, above the average for freshman work. And they have improved steadily throughout the year. And the reason for this is not hard to find.

Writing is personal. Even a freshman's theme, if it is not a mere retailing of somebody else's reactions, in the high-school manner, expresses the boy's ideas about something in which he has interested himself, or appears interested, at least for the moment. His reactions comprise his theme. Is it not more reasonable to suppose that a reader can judge those reactions and their expression more wisely if he judges them on the basis of real understanding which comes from talking them over with the student himself? The boy may have intended to say something, which he has failed, as he would say, to have "got it across." If I read his theme in my home, and see that he didn't, I write a brief comment to that effect on the theme itself, and return it to him in the classroom. I have told him that he has not made himself clear, that he has not succeeded in giving me his idea, but I have *not* told him *how* to make himself clear, or how to interest me. Or perhaps I do not quite see what he meant. It may be that I do not see because I do not understand the boy himself. Often he himself doesn't really see what he means. But if he reads the theme with me, and we talk it over, he and I work together to

express his idea, and his first effort next time is apt to be much more successful. We understand each other better.

The method, I repeat, takes time. But any method of theme reading does, and personal conference theme reading is time well spent, while "boudoir theme reading" is time wasted. I cannot criticize a student's work properly if I consider it as a cold and lifeless thing. I need the student there, with his personal reactions to my reactions, his own blurted comments. It is an opportunity to talk that theme over with the living writer. I could never do justice otherwise; I often wonder whether any teacher really can. Perhaps this is why I do not agree when I hear it said that English teaching is all right, except for "that eternal theme reading." I enjoy theme reading. It is great sport. With the boy sitting beside me it has become an interesting part of the day's work, not a tiresome task of the lamp-shaded, half-asleep, "fifteen-more-of-these-blasted-themes" evening.

The personal relation of the teacher of English composition to his students is much more intimate than that of the teacher of more abstract subjects like Mathematics and Science. A boy's themes are his own ideas on paper; the basis for his work is his own. This gives the English teacher a unique opportunity. It is his business to show his students how to express their thoughts. His comments and instructions are valuable only insofar as they create a helpful, perhaps corrective, reaction in the minds of the students. The teacher must *speak* his ideas. Red ink has never improved anyone; it has discouraged many.

Perhaps my "touch system" has succeeded especially well because my work has been in an Engineering College, among engineers and architects in the making. The very atmosphere of the place is more human, more interesting, than in any other college of the university. The students seem more alive—I think they are. Perhaps my system would not work so well in a large, heterogeneous College of Liberal Arts, with its super-sophisticates and its "young intellectuals." I think it would. I think it would have worked in the college I at-

tended. I wish that it had been tried. And some day I may try it in some such college. It might help to restore a bit of the personal element into American education.

American universities have become too large, too much like factories. They have lost almost all of the contact gained from personal instruction. Classes have grown unreasonably large. If there is any means of enabling the student better to understand the instructor, the instructor more fairly to judge the student and more clearly to understand him, it is invaluable. My theme conferences give me at least such an opportunity.

I have experimented, for the pleasure of the experimenting, with substitutes for the personal conference. I have expounded theme writing at length in my classes. I have tried to show how a theme should develop and move and have some "meat." It seems futile. Generalizations are never successful. John Jones, who sits in the front row, may get something from what I say. But Frank Johnson, who sits in the third row, may not find anything usable in all I have said. He may be doing in each of his themes everything I advise, and his troubles continue. They are personal troubles. The good teacher will discuss these personal difficulties with Frank Johnson—with all the Frank's.

Once I had an exceptionally interesting student. He wrote humorous themes which were actually humorous in the reading, well worked out, distinctly clever. I always knew what to expect from him, I thought. And then one day he wrote me a sentimentally poetic theme. I wondered at it; it too was very well done—his sense of humor had guided him over the sobs—but it was startlingly different. When he came for his conference that week, I read his theme with him, talked it over, asked him about it. He told me that he liked to read poetry, especially, he said, "sad poems." I suggested to him that he keep on reading them, but that he remember, too, that he had a natural up-curve at the corners of his mouth, and a laugh in his eyes. I told him that a combination of his two moods would be delightful in his theme work—difficult, but

extremely pleasing—and that he could do it. He took the suggestion; his later themes were a revelation, better than any he had ever done before—humor touched with depth. He became interested in writing, and now—his required English work is finished—is experimenting on his own initiative. I never could have made that suggestion in red ink; I could never have expressed something so personal delicately or tactfully enough.

To two boys during the past year I made similar suggestions. One I told in conference that his themes were too facile, that they were very well written, but that there was not much to them, dessert but no meat. His themes began to improve—those ideas I knew he had began to emerge. Depth came with the sparkle. The second wrote vivid descriptive themes. He saw the picture, wrote the scene. I told him he could write lyric poetry—he had never tried it, had never read much poetry, in fact. But his eyes had a song in them. Both boys were freshman architects.

Some time ago I received two themes from these two boys. The first boy * wrote me this:

WHEELS.

" 'Round and 'round the little wheel goes, and where it stops nobody knows. *This* gen'l'mun gets the handpainted jahdineer! Quarters on a number, ladees and gen'l'men. 'Round and 'round the little wheel goes. . . ."

And so it goes—a little wheel the life of the Carnival. Other wheels helping it—the great Ferris wheel rearing its metal skeleton against a black sky and reflecting the lights from the noisy crowd below—the merry-go-round, whirling in a pool of tin music, propelled by a motor whose efficiency is wheels, running on bearings that are wheels—wheels! And when the Carnival moves, it moves on four-wheeled cars.

Machines in great factories ground out these things of wheels—machines that were masses of wheels. Everything about the Carnival, from the lightest of its amusements, to its most earnest business, "moving the show," is dependent upon wheels. Were it not for wheels, there would be no Carnival.

Thousands of years ago, man was not man, but an intelli-

* Stowell D. Leach.

gent member of the genus "ape." One day he fashioned a crude wheel of stone and wood. To-day we should call it a grindstone. But he took two of these stones, hung something between them, hitched his horse to them, and went his way a-whistling. The first wagon! He was no longer an ape. To-day he rides around in four-wheeled motor cars, paid for from the earnings of great factories of whirring wheels.

" 'Round and 'round the little wheel goes, and where it stops nobody knows." But if it stops. . . .

The second boy † wrote me this:

TREASURE.

Night wind sighing in the trees,
Dreamy music on the breeze,
Cries and laughter from afar,
Life is twinkling like a star—
Treasure.

On with languid steps we stroll,
Rest upon the lake-lapped knoll;
Underneath the summer sky
Dreams are dreamed before they fly—
Treasure.

White moon sparkling on the wave,
Through dark trees a silver stave—
Evanescent fleeting light,
Aid to Fancy in her flight—
Treasure.

Warm and moonlit nights must end,
That day its sun and haze may blend;
When play, and work, and action thrill,
Nights like this are counted still,
Treasure.

The students themselves find my "touch system" helpful, naturally. One of them remarked to me recently, after his theme writing had shown marked improvement, "It's a lot easier to write them now, because we talk them over together. My last instructor wrote his comments. I read the comments, but I never paid much attention to them, and didn't get any help from them. Most of the time, too, they were pretty general."

† John C. Hunner.

A fortunate result of such a theme conference system is that the student loses most of his awe of the English instructor. He loses his awe, and gains understanding. He appreciates. He knows that with the closer contact come help and interest. He sees that an English instructor need not be "queer," though it might seem that he should be. Possibly the student will like the instructor even if he does not like the subject (he will learn later that the two travel together). Why, I sometimes imagine that the insight, the contact gained from sitting with the lion in his den once a week may give some of these freshman engineers and architects a desire to become teachers themselves. The thought pleases me.

THE CONFERENCES ON ENGLISH.

The Committee on English of the Society for the Promotion of Engineering Education desires to call attention to the joint conference of deans, administrative officers, and teachers of English, to be held at the University of Maine, Orono, June 27th, and to the opportunity for the more intimate discussion of the problems of English teaching afforded by the round-table conferences of the teachers of English themselves, to be held during the week of the 27th of June, in connection with the annual meeting of the Society.

The subject for the joint conference on June 27th will be "The Teacher of English." At the luncheon meetings, Miss Harbarger, of Ohio State, will open up, for our discussion, the whole subject of freshman composition, by her report on her extensive survey of the status of this work in the engineering colleges.

This is the sixth year for these conferences on English; they have proved very helpful and stimulating in the past. With the increasing interest in the vital part English must take in the education of engineers, each year should make such occasions more and more significant in shaping the policies of our colleges with reference to it, and in developing among the teachers of English themselves professional pride in the opportunity for educational service afforded.

The Committee asks the continued cooperation of the deans in making these conferences valuable to all concerned. In the first place, it is urged that they themselves attend, as they have done in the past, and that they make it possible for some representative of their English staff also to be present. The teachers of English in the engineering colleges are not many of them members of the Society, and may not be readers of the JOURNAL OF ENGINEERING EDUCATION. It would, there-

fore, be a great service to the Committee if the deans would call this notice to their attention.

The Committee would also appreciate suggestions and criticisms from any source whatsoever. Address: J. Raleigh Nelson, Chairman, 927 Forest Avenue, Ann Arbor, Michigan.